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SPECIFICATION FOR ELECTRONIC WEIGHING SYSTEMS

PART III REQUIREMENTS

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SPECIFICATION FOR ELECTRONIC WEIGHING SYSTEMS

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Indian Standard

SPECIFICATION FOR ELECTRONIC WEIGHING SYSTEMS

PART III REQUIREMENTS

0. FOREWORD

0.1 This Indian Standard (Part III) was adopted by the Indian Standards Institution on 9 April 1981, after the draft finalized by the Electronic Measuring Equipment Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 It has been decided to prepare specification for electronic weighing systems in the following four parts:

Part I	Terms and definitions
Part II	Methods of measurements
Part III	Requirements
Part IV	Code of practice

0.3 This standard covers the requirements for electronic weighing system. An electronic weighing system comprises the basic electrical load cell employed to sense the applied load/force and the associated electronic measuring equipment employed to indicate, display or record the mass. For the sake of clarity and convenience, the requirements have been specified for electrical load cells and the total weighing systems separately.

0.4 This standard does not cover the requirements for electronic weighing systems used for industrial process measurements.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part III) covers the requirements of electrical load cells and the total weighing system.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 9281 (Part I)-1979* shall apply.

3. PERFORMANCE REQUIREMENTS

3.1 The electrical load cells shall meet the requirements specified in Table 1.

TABLE 1 REQUIREMENTS OF ELECTRICAL LOAD CELLS

Sl No.	Parameter	Units	Typical Values		
			Class 1	Class 2	Class 3
(1)	(2)	(3)	(4)	(5)	(6)
1.	Model No.		Model No.	Rated Load	Excitation Voltage
2.	Serial No.		Sl No.	Sensitivity MV/V/ Rated Load	Input/ Output Impedance
3.	Rated Load (RL)	kg	To be specified by the manufacturer		
4.	Mode of operation	Compression/ tension/ universal			
5.	Input resistance/ impedance	Ohms	To be specified by the manufacturer		
6.	Output resistance/ impedance	Ohms	To be specified by the manufacturer		
7.	Input voltage/ current	V/A	To be specified by the manufacturer		
8.	Input voltage/ current (*Max*)	V/A	To be specified by the manufacturer		
9.	Overload, safe	Percent of RL	150	150	150

(*Continued*)

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*Specification for electronic weighing system: Part I Terms and definitions.

TABLE 1 REQUIREMENTS OF ELECTRICAL LOAD CELLS — *Contd*

Sl No.	Parameter	Units	Typical Values		
			Class 1	Class 2	Class 3
(1)	(2)	(3)	(4)	(5)	(6)
10.	Overload, ultimate	Percent of RL	200	200	200
11.	Accuracy	Percent of RO	± 0·02	± 0·05	± 0·1
12.	Rated output voltage	mV/V/RL			
13.	Tolerance on rated output	Percent of RO	+ 0·1	± 0·25	± 0·05
14.	No load output	Percent of RO	± 0·5	± 1·0	± 2·0
15.	Drift in no load output (zero drift) after 1 hour of warm-up	Percent of **RO/h**	± 0·005	± 0·01	± 0·02
16.	Instability of RO after warm-up period of 1 hour	Percent of **RO/h**	± 0·005	± 0·01	± 0·02
17.	Non-linearity (wherever applicable)	Percent of RO	± 0·05	± 0·2	± 0·5
18.	Hysteresis (wherever applicable)	Percent of RO	0·01	0·03	0·05
19.	Non-repeatability of zero output	Percent of RO	± 0·02	± 0·05	± 0·1
20.	Non-repeatability of rated output	Percent of RO	± 0·02	± 0·05	± 0·1
21.	Creep at rated load after 30 minutes	Percent of RO	± 0·02	± 0·05	± 0·1
22.	Creep recovery after 10 minutes	Percent of RO	– 0·02	– 0·05	– 0·1
23.	Side load, safe	Percent of RL	10	10	10
24.	Side load, ultimate	Percent of RL	20	20	20
25.	Side load error for 10 percent RL	Percent of RO	± 0·1	± 0·2	± 0·5
	Concentric angular loading error				
26.	At 1° inclination	Percent of RO	± 0·02	± 0·05	± 0·1
27.	At 3° inclination	Percent of RO	± 0·06	± 0·15	± 0·3

(*Continued*)

TABLE 1 REQUIREMENTS OF ELECTRICAL LOAD CELLS — *Contd*

SL No.	PARAMETER	UNITS	TYPICAL VALUES		
			Class 1	Class 2	Class 3
(1)	(2)	(3)	(4)	(5)	(6)
28.	*Eccentric loading error* (at 1 mm of eccentricity)	Percent of RO	± 0·05	± 0·1	± 0·2
	Eccentric angular loading error				
29.	1 mm eccentricity and 1° inclination	Percent of RO	± 0·1	± 0·2	± 0·5
30.	1 mm eccentricity and 3° inclination	Percent of RO	± 0·15	± 0·3	± 1·0
	Temperature range				
31.	Compensated	°C	0 to 50°	0 to 50°	0 to 50°
32.	Usable	°C	−10 to 60°	−10 to 60°	−10 to 60°
33.	Temperature effect on no load output	Percent RO/°C/h	± 0·002	± 0·01	± 0·03
34.	Temperature effect on rated output	Percent RO/°C/h	± 0·003	± 0·01	± 0·03
35.	Deflection at the rated load	Microns/degree	To be specified by the manufacturer		
36.	Insulation resistance	megohm	Not less than 1 000 MΩ		
37.	Shunt calibration output (wherever applicable)	Percent of RO	To be specified by the manufacturer		
38.	Tolerance on shunt calibration	Percent of RO	To be specified by the manufacturer		
39.	Humidity	Percent of RH	Max of 95 percent		
40.	Effect of radiation, vibration and corrosion	—	To be specified by the manufacturer		
41.	Electrical connection	—	To be specified by the manufacturer		
42.	Dimensions, weight	mm/kg	To be specified by the manufacturer		
43.	Casing material	—	To be specified by the manufacturer		
44.	Surface finish/protection/type sealing	—	To be specified by the manufacturer		
45.	Mounting details and outline drawing	—	To be specified by the manufacturer		
46.	Manufacturer's name and address	—	To be specified by the manufacturer		

3.2 The total electronic weighing systems shall meet the requirements specified in Table 2.

TABLE 2 REQUIREMENTS OF TOTAL ELECTRONIC WEIGHING SYSTEMS

(*Clause* 3.2)

Sl No.	Parameter	Units	Typical Values		
			Class 1	Class 2	Class 3
(1)	(2)	(3)	(4)	(5)	(6)
1.	Rated load	kg	To be specified by the manufacturer		
2.	Accuracy	Percent of RO	± 0·05	± 0·1	± 0·25
3.	Transducer excitation and distortion/regulation	—	To be specified by the manufacturer		
4.	Non-linearity	Percent of RO	± 0·05	± 0·08	± 0·15
5.	Drift of no-load output with temperature	Percent of RO/°C	± 0·005	± 0·02	± 0·03
6.	Drift of no-load output with time after 1 h	Percent of RO/h	± 0·015	± 0·03	± 0·05
7.	Drift of full scale output with time after 1 h	Percent of RO/h	± 0·015	± 0·03	± 0·05
8.	Internal calibration	—	To be specified by the manufacturer		
9.	Number of scale division	—	To be specified by the manufacturer		
10.	Resolution	Percent of RO	To be specified by the manufacturer		
11.	Tare provision	Automatic/ manual	To be specified by the manufacturer		
12.	Display	—	To be specified by the manufacturer		
13.	Recording	—	To be specified by the manufacturer		
14.	Speed of measurement	—	To be specified by the manufacturer		
15.	Overload indication	—	To be specified by the manufacturer		
16.	Response to full scale	s	3	3	3
17.	Operating temperature	°C	As specified in IS : 1900 (Part I)-1977*		
18.	Warm up periods	min	60	60	60
19.	Weight	kg	To be specified by the manufacturer		
20.	Dimensions	mm	To be specified by the manufacturer		
21.	Environmental condition	—	To be specified by the manufacturer		
22.	Operating voltage and frequency	V and Hz	To be specified by the manufacturer		
23.	Tolerance on operating voltage	Percent of operating voltage	– 20 to + 10	– 20 to + 10	– 20 to + 10

*Basic environmental testing procedures for electronic and electrical items: Part I General

4. MARKING

4.1 Each electronic weighing system shall be legibly and indelibly marked with the following information:

a) Model designation and serial number,
b) Rated load,
c) Non-linearity,
d) Resolution,
e) Manufacturer's name or trade-mark, and
f) Country of manufacture.

4.2 The product may also be marked with Standard mark.

4.3 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

5. TESTS

5.1 Test Methods — The parameters specified in this standard shall be measured in accordance with IS : 9281 (Part II)-1979*.

5.2 Classification of Tests

5.2.1 *Type Tests* — The tests specified in Table 2 shall constitute type tests.

5.2.2 *Routine Tests* — The following shall constitute the routine tests:

a) Rated load,
b) Accuracy,
c) Non-linearity, and
d) Resolution.

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*Electronic Weighing System: Part II Methods of measurement.

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